ATTACHMENT A

Remote Monitoring Project

HDR

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The purpose of this memo is to:

1. Identify off the shelf equipment for the purpose of improved functionality and ease of use that can be adapted to the current remote monitoring system. Identified equipment is easily installed in existing cabinets. Three choices of
equipment and vendors will be preferred.

2. Identify a historical repository and software for the AEA Anchorage facilities. The historical repository will maintain data stored on-line for years. The repository will be accessible to users without the requirement of IT personnel to reload old data and will be compatible with the current monitoring equipment.

3. Storage equipment will have the potential for 60 days of stored data and will be compatible with the current remote monitoring system.

4. Communication equipment and services will be compatible with the current monitoring equipment and available to the rural communities.

Bitronics M571 Monitoring and Recording Meter

One of the meters considered tested for use in the remote monitoring project was the Bitronics M57X Series. This meter will record up to 230 parameters including all of those required by this project. The meter has digital inputs that can be used for counter data required for recording fuel usage data. The trend recorder can be configured to record data at rates between 1 and 720 minutes in 1 minute increments. This meter has Ethernet capabilities that are required for remotes interrogation via the internet.

The files stored in the Bitronics meter are saved in a proprietary format. Once the files are retrieved from the meter by the Bitronics software, they can be displayed by only the Bitronics software. The files can be converted to IEEE Standard COMTRADE files. (Note: COMTRADE stands for COMmon format for Transient Data Exchange for power systems.) Several aftermarket viewers are available for ComTrade files.

Hunt Power Products EMon Class 3000 Meter

The Emon Class 3000 meter reviewed for this study is a circuit board based device that is mounted in a Type 12 Hoffman box. The enclosure makes this device suitable for indoor protection of components exposed to dust, dirt, oil and water. The meter is supplied with clamp on current transformers rated to 100 amps as tested higher amperage ratings are available. The E-Mon class 3000 meter is a revenue meter that is designed for Automated Meter Reading (AMR). This device is a true revenue meter and is optimized for that function.

The Emon software supplied with the meter has the ability to read meters and generate billing information. This meter and software is better suited for the revenue role for which it was designed. The information that is required for the Remote Metering Project could be obtained but with some difficulty. The Emon class 3000 meter is not recommended for the Remote

Metering Project, but could be considered for an AMR project that could use a program which can read the metering in an area and generate the bills for the clients accordingly.

Satec PM 172E Meter
Software PAS Version 1.3 Build 11

The PM172E is currently the standard meter installed in the power plants supplied by the Alaska Energy Authority.

The SATEC PM 172E meter has the capability to measure all of the required quantities for the remote metering project. The standard metering functions such as 3-phase volts, amps, power, and power factor are available in the basic model (PM172P). The E series PM172E adds the Energy quantities, Watt Hours and VAR Hours to the list of measurements that the meter can perform. The fuel usage measurement can be recorded by this meter using the digital inputs that are provided with this meter and a pulse .

The files retrieved from the meters are stored in a Microsoft Access Database. The information stored in these files can be viewed via the PAS software supplied with the meters. Using Microsoft Access (which is available as a component of Microsoft Office Professional or as a stand alone software), the database files can be converted to the Microsoft Excel file format.

From both the PAS software or from Microsoft Excel, the data can be trended to aid in analysis.

The software supplied with the meter has the ability to read the PM172 series of meters on a periodic basis. A scheduler is built in and is relatively easy to configure. The files are stored in the meter; therefore, if the communications with the meter are lost for up to 3 weeks, the information stored in the meter is not lost. The length of time that the meter can store data is a configurable number that can be increased or decreased as needed. The communications circuit will be the determining factor. With larger file sizes, the download will take longer and the possibility of communications loss will be greater. The file size for 3 weeks of data with 15 data points is approximately 136 kilobytes. This is not a large file by today's standards, but with the limited communications capability at remote sites, this may become an issue. The ability to adjust file size will be an asset when dealing with these concerns.

Recommendations:

The Hunt Power Products E-Mon Class 3000 Meter is not suitable for this project. This meter and software are designed for revenue use. The Automated meter reading and billing capabilities should be considered if a need arises for one of the AEA clients.

The Bitronics M57x relay is a viable choice for the Remote Metering Project with one exception. The proprietary nature of the file system will require additional programming to get the data into a more commonly used format. ComTrade files are the IEEE standard file format; however, the number of software packages that can manipulate data stored in ComTrade files is somewhat limited at this time.

The SATEC PM 172E

This meter is capable of recording all required parameters. A fuel flow meter with contact pulse output will be required to monitor fuel usage with this meter. The number of gallons used will be represented by a pulse accumulator in the meters data set.

The software supplied with the meter has the ability to read the PM172 series of meters on a periodic basis. A scheduler is built in and is relatively easy to configure. The files are stored in the meter; therefore, if communications with the meter are lost for approximately 3 weeks, the information is not lost. This is a configurable number that can be increased or decreased as needed. The communications circuit will be the determining factor. With larger file sizes, the download will take longer and the possibility of communications loss will be greater. The file size for 3 weeks of data with 15 data points is approximately 136 kilobytes of information. This is not a large file by today's standards, but with the limited communications capability at remote sites, this may become an issue. The ability to adjust file size will be an asset when dealing with these concerns.

Final Recommendations:

The recommendation of this study is to use the SATEC Meter for the Remote Metering Project. The meters that are in the field can be reconfigured to handle the additional data storage. In older stations, the meters can be added by AEA staff without additional training. Satellite internet communications will be required at some locations that are without another option for internet access.

Instructions for Meter and Software configuration:

The software version and firmware versions of the meters should be updated to the latest due to issues found with older versions during testing.

The versions used during testing are as follows:

Satec:	PM 172E-N Meter
Firmware version	V13.2.1
Boot:	V2.2.1
Software:	PAS Version 1.3 Build 11

The software and firmware versions listed above should be the minimum used for any installations involving the Remote metering project.

File storage: It is suggested that the files be stored on a secured FTP server. File Transfer Protocol (FTP) is a network protocol used to transfer data from one computer to another through a network such as the Internet. If the files are written directly to the subdirectories on the FTP server using AEA's internal network, a minimal amount of maintenance will be required. The

total file size will need to be monitored to ensure that the server hard drives are not filled beyond capacity. Then aging data could be moved automatically to an archive storage location.

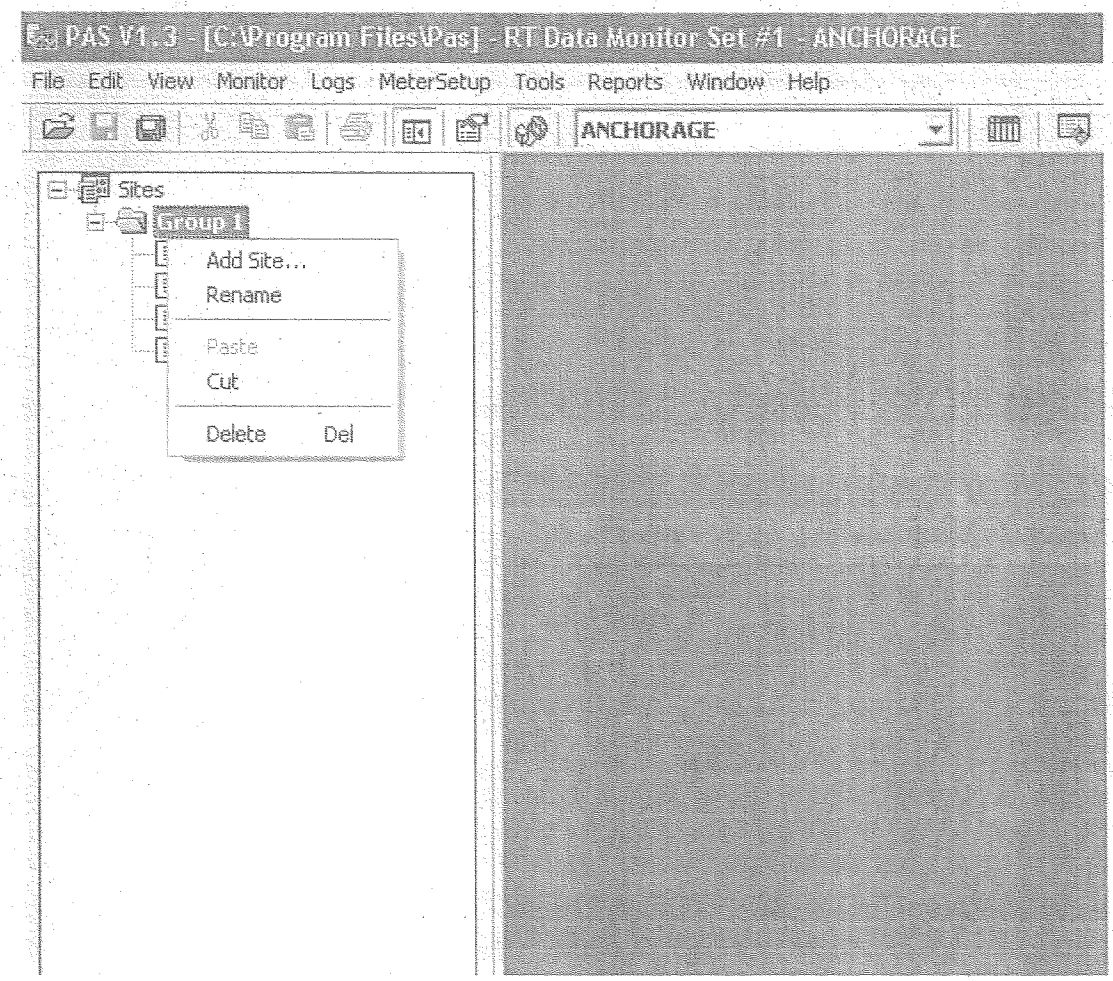
The use of an FTP site will allow user from remote locations to access the Meter data. A user name and password would be required for approved users to access the site. The ability of users to delete, copy, or modify the data on the site can be restricted.

Alaska Energy Authority has an unsecured FTP site at ftp://aidea.org/ . This site is not suitable for storage of the remote metering data. The data on this site can be accessed by unauthorized users. The data that has been gathered from the remote could be deleted by accident or intentional malice and therefore lost with little hope of recovery.

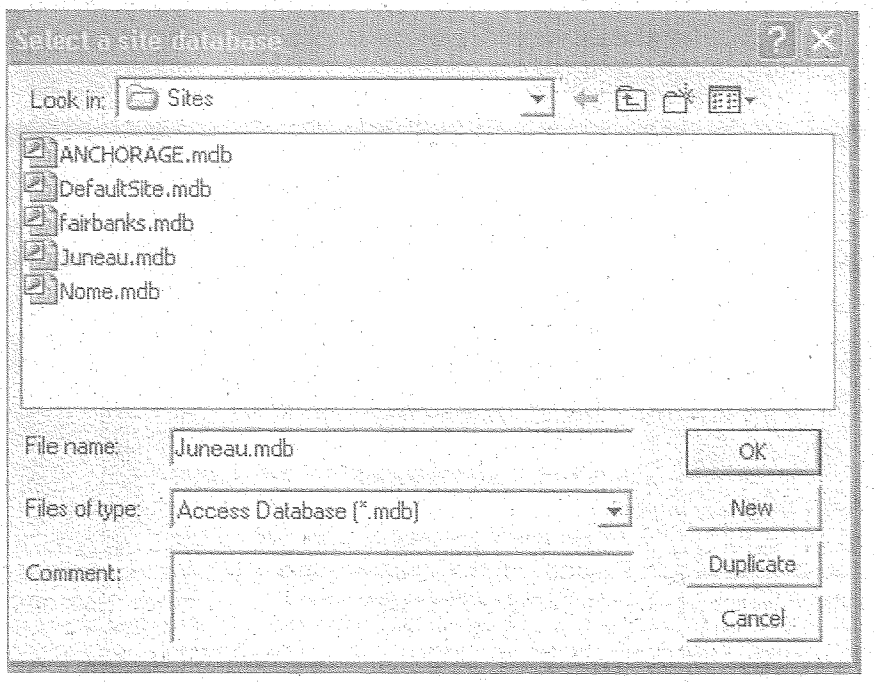
Instructions for configuring the PAS software by SATEC:

Adding a metering site to the PAS software:

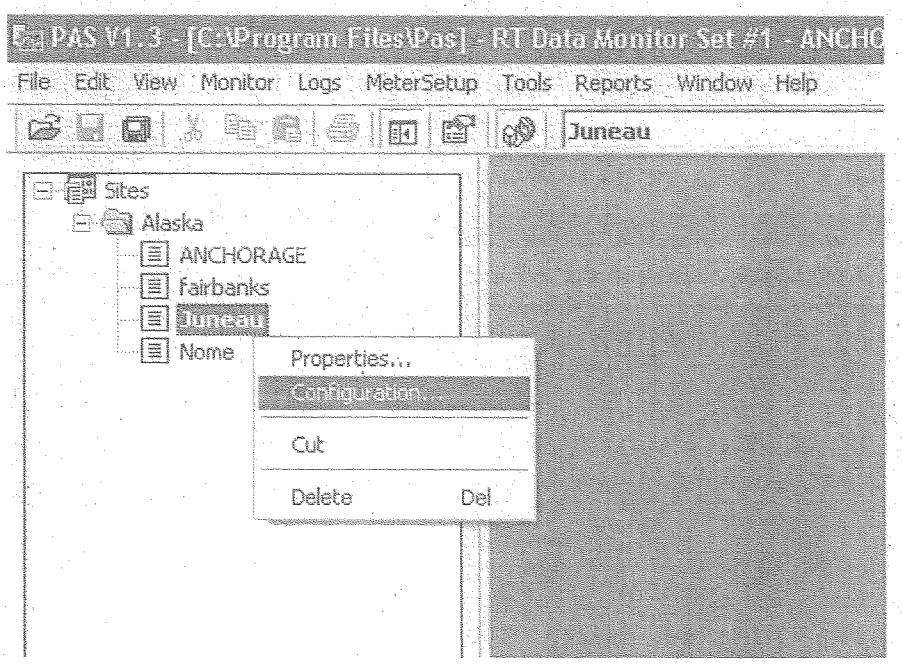
To add, right click on Group 1 and click on ADD site.



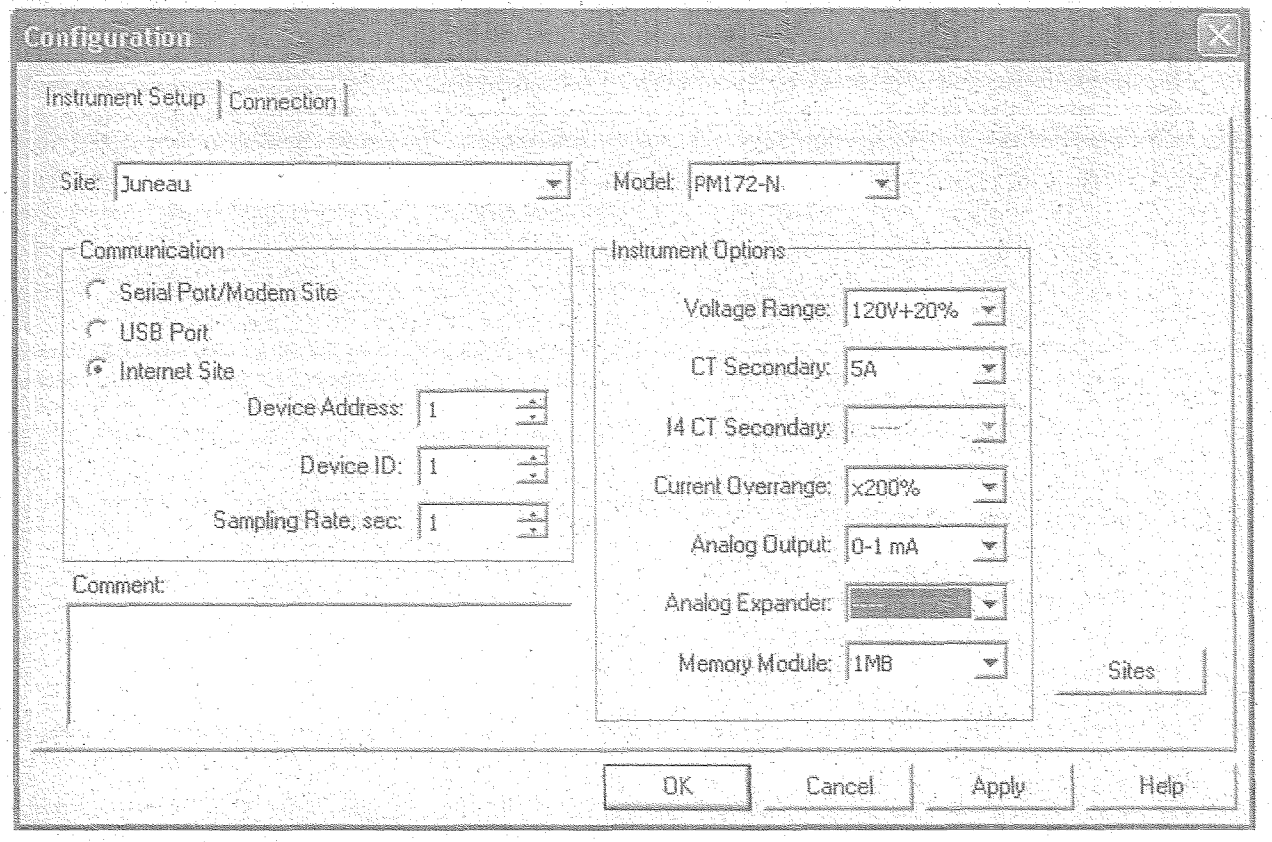
The Select a database window will appear. In this window, click on NEW. Then enter the site name in the file name box and click OK.



Go back to the sites list and right click on the new site that was just created. Choose configuration from the drop down list.

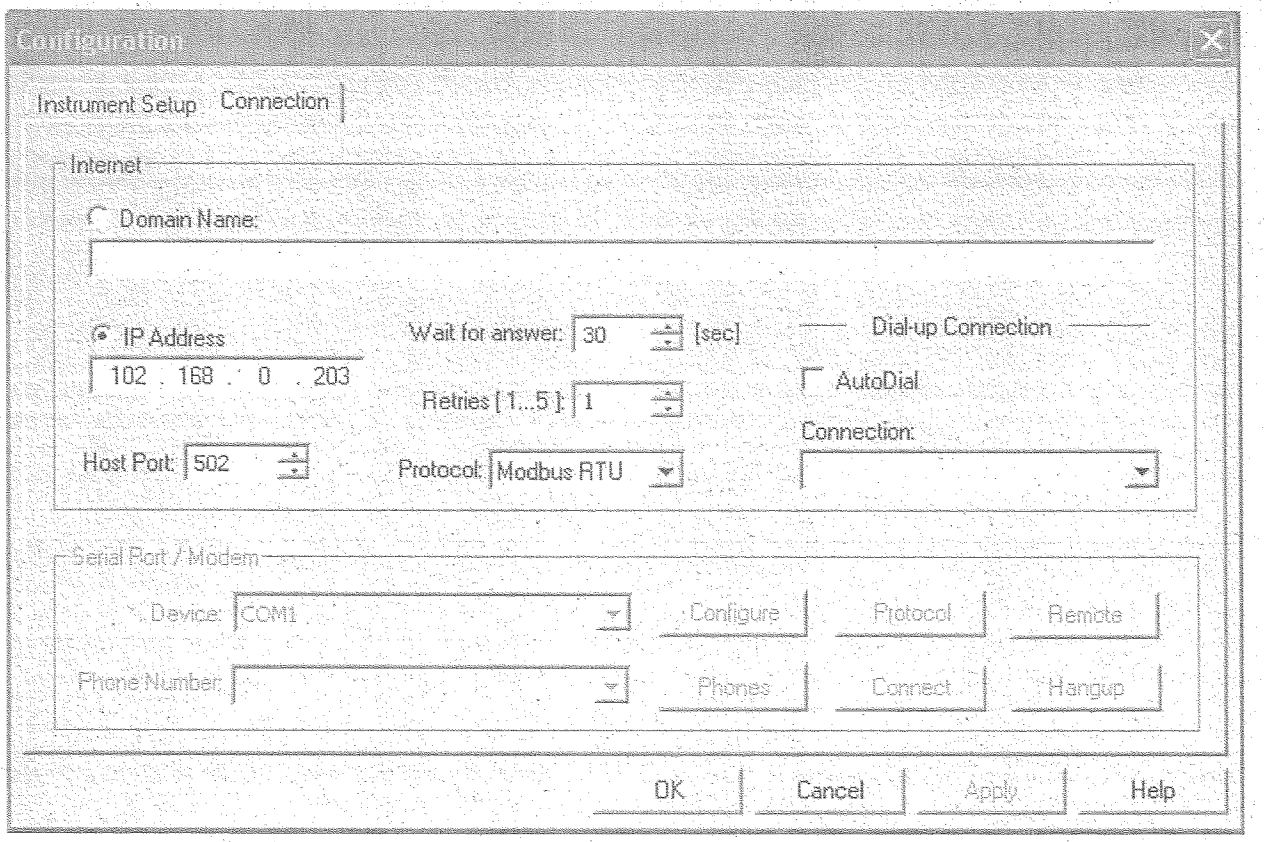


Select "Internet site" under communications. On the configuration screen for the site, select the model from the pull down menu. In the communications section, pick "Internet Site" and set the Device Address, Device ID and Sampling Rate as shown below. All meter addresses can be set to 1 unless multiple meters are located at a single domain.



Next, click on the Connection Tab at the top of the Configuration window.

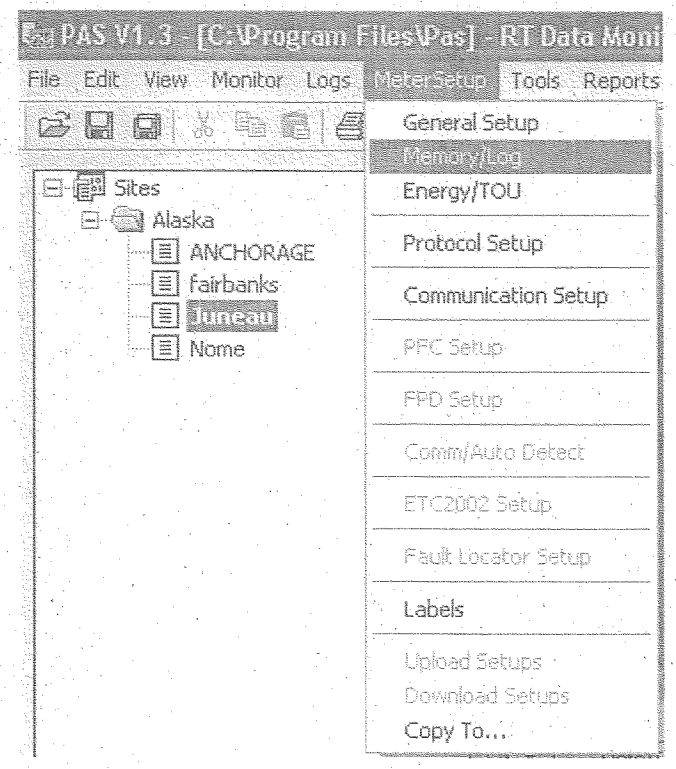
This window will require some information from the IT department; in particular, the Domain name and or IP Address where the meter resides. For all of the other parameters Host port, Protocol, "Wait for Answer" and Retries set as shown below.



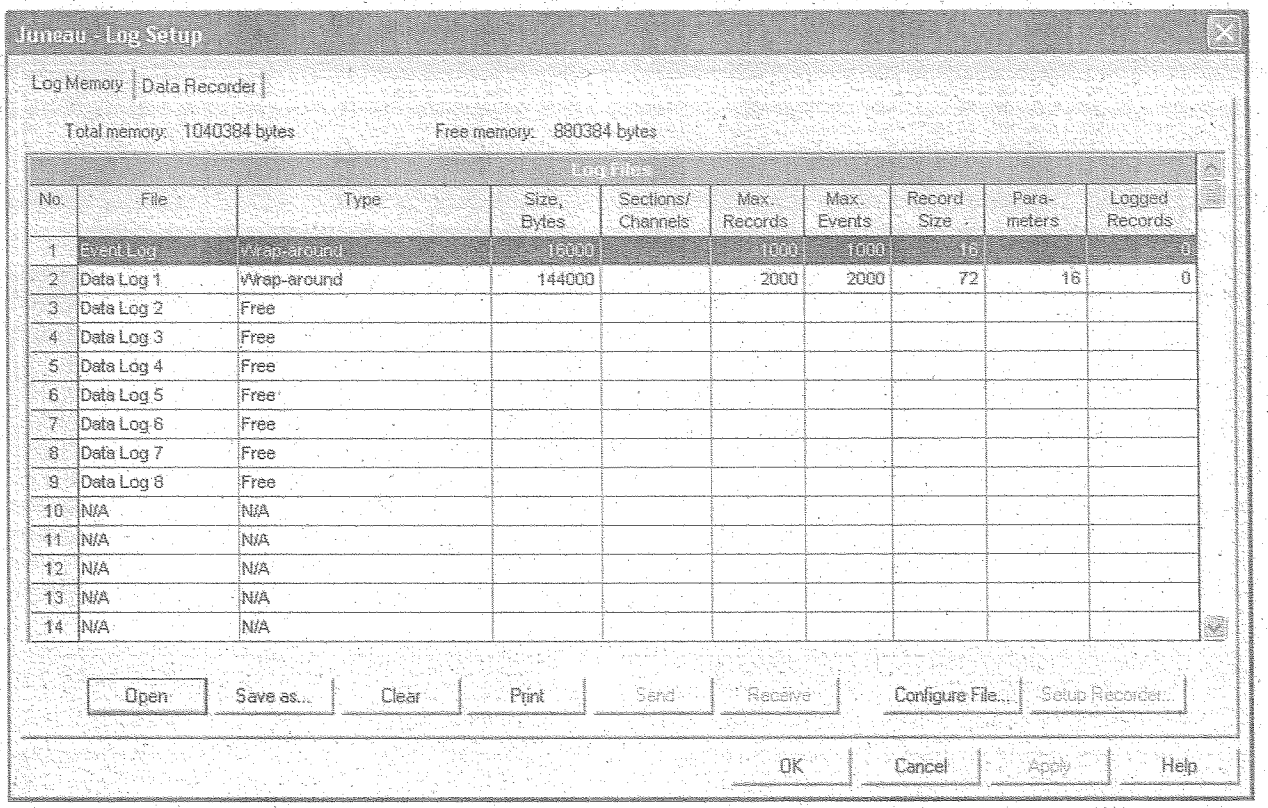
When the settings are complete, click on "Apply" and then click on OK to return to the main screen.

For the next few steps, insure that the PAS program is off-line. This can be done by clicking on the Monitor tab and checking to see if "Online" is not checked.

Select the site to be configured and then select the MeterSetup Tab from the drop down menu click on Memory/Log.

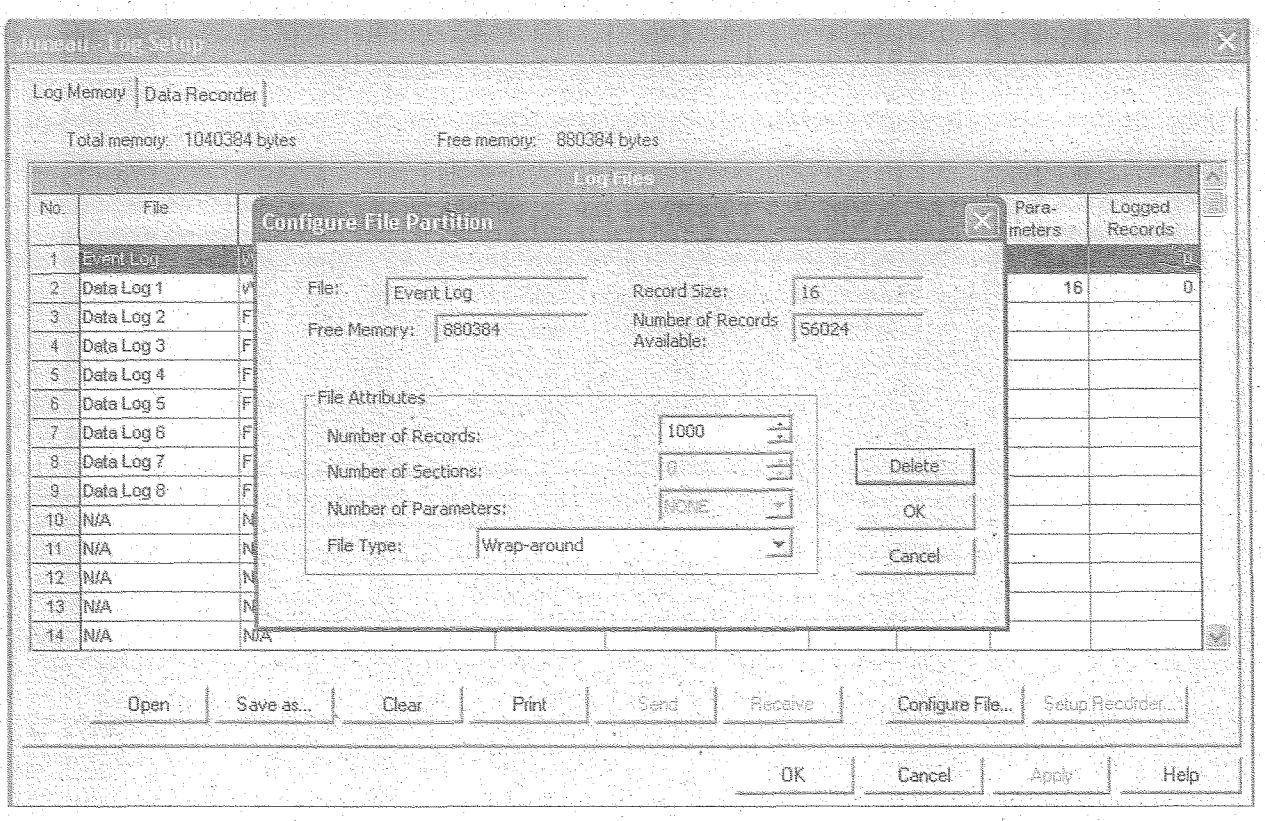


This window set the memory use in the memory



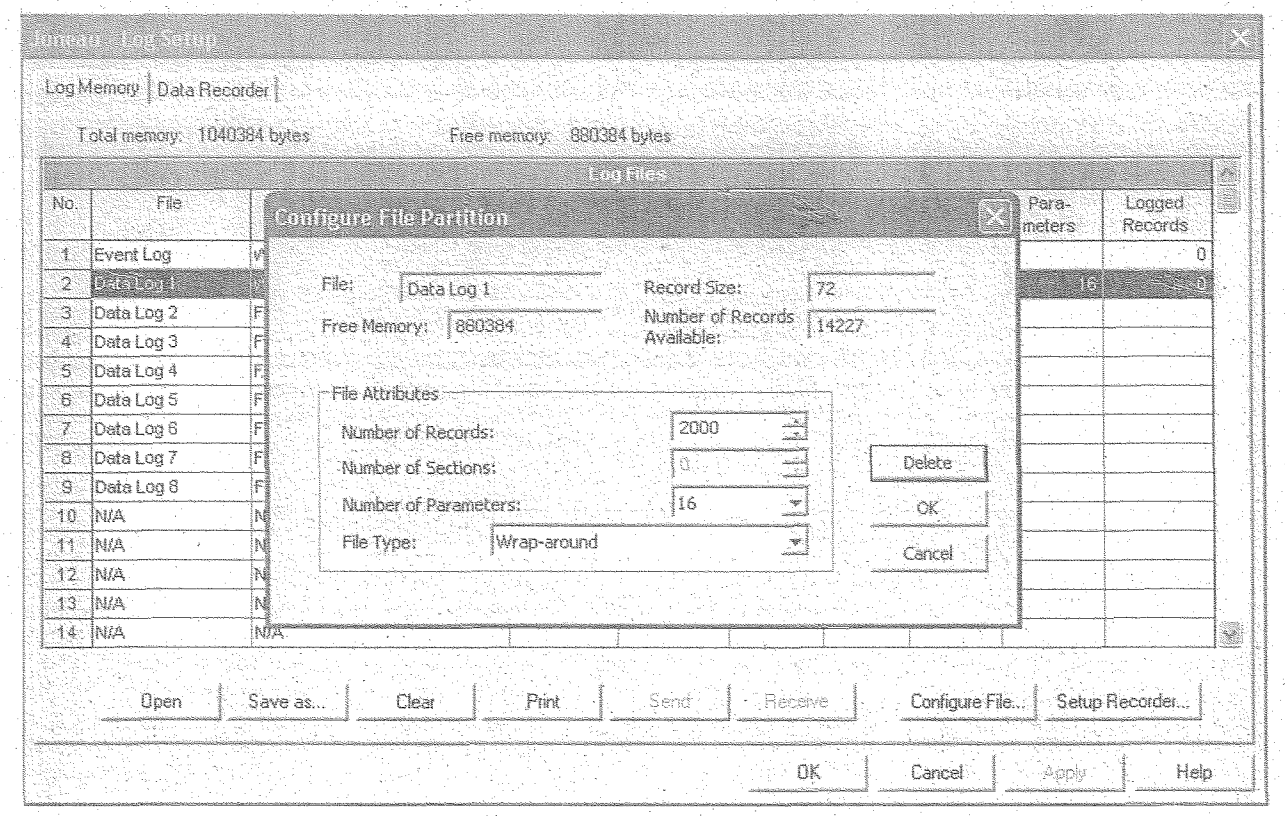
By double clicking on the line for Event Log, the Configure File Partition window will appear.

Set the number of records to 1000 and the file type to "Wrap-Around".



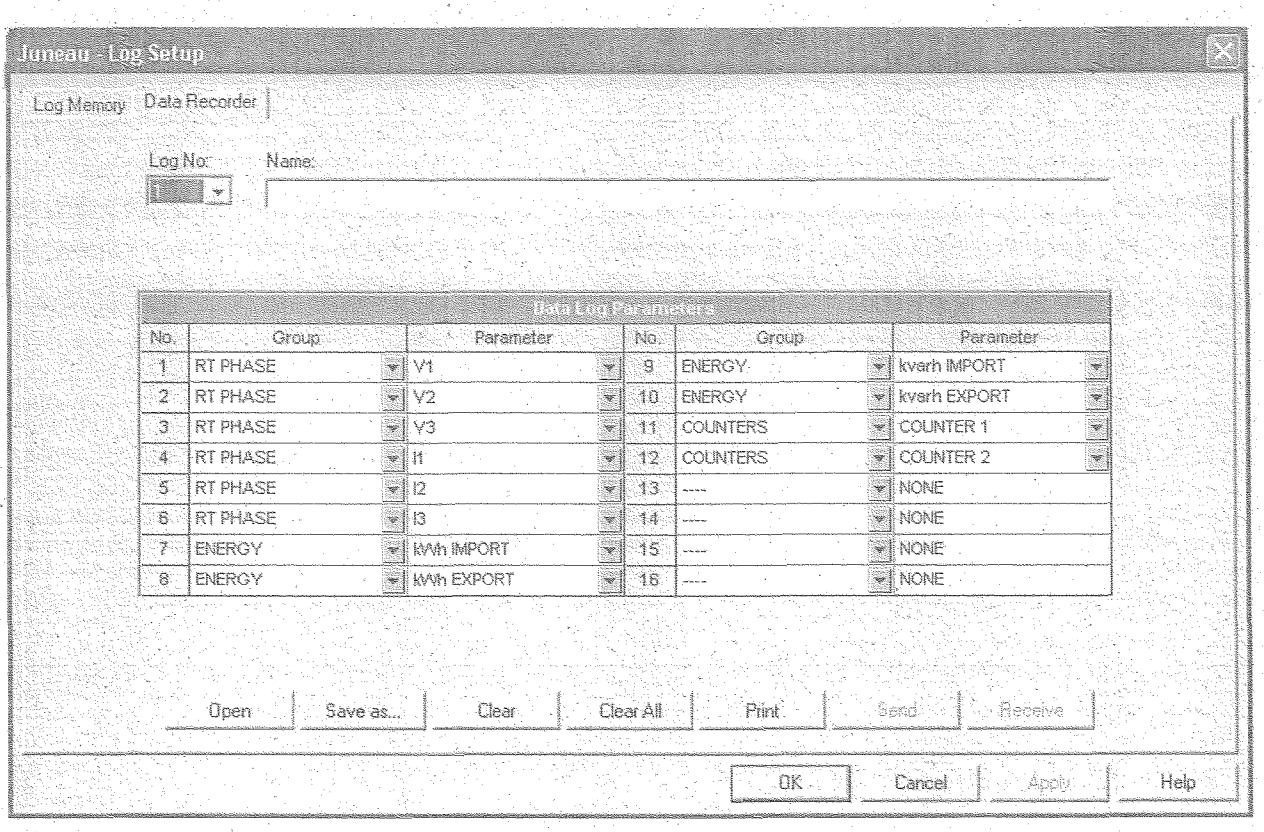
Close the file partition window and double click on the line containing Data Log 1.

On this window set the number of records to 2000. This will cause the meter to store all of the records for approximately 3 weeks before overwriting any data points. Set the number of parameters to 16. The parameters are the data points to be recorded such as KWatts, KVARs, Volts and Amps.

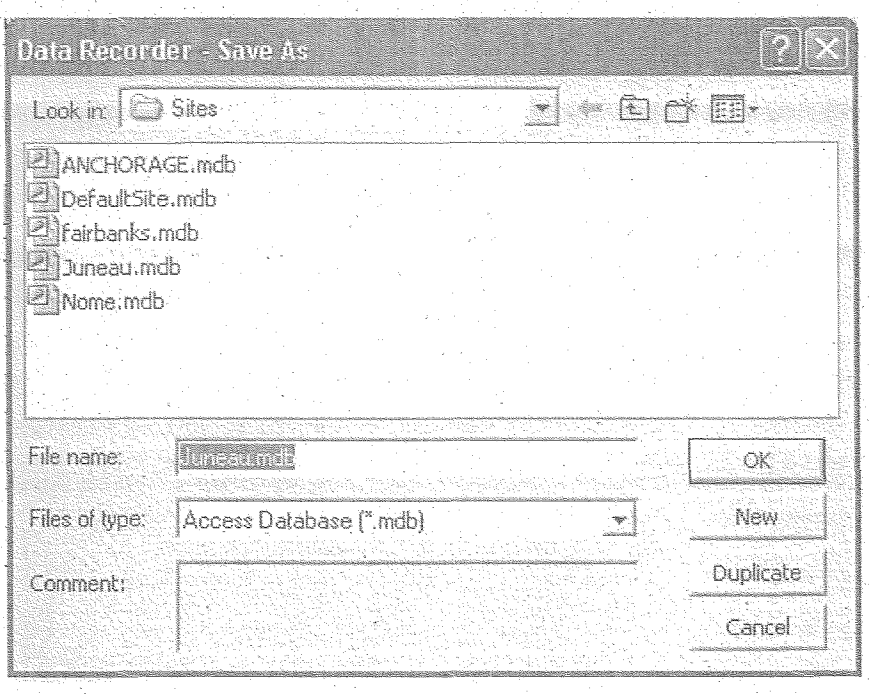


Click on OK and the choose the Data Recorder Tab at the top of the Log Setup window.

Configure the Data recorder as below by using the drop down at each parameter.

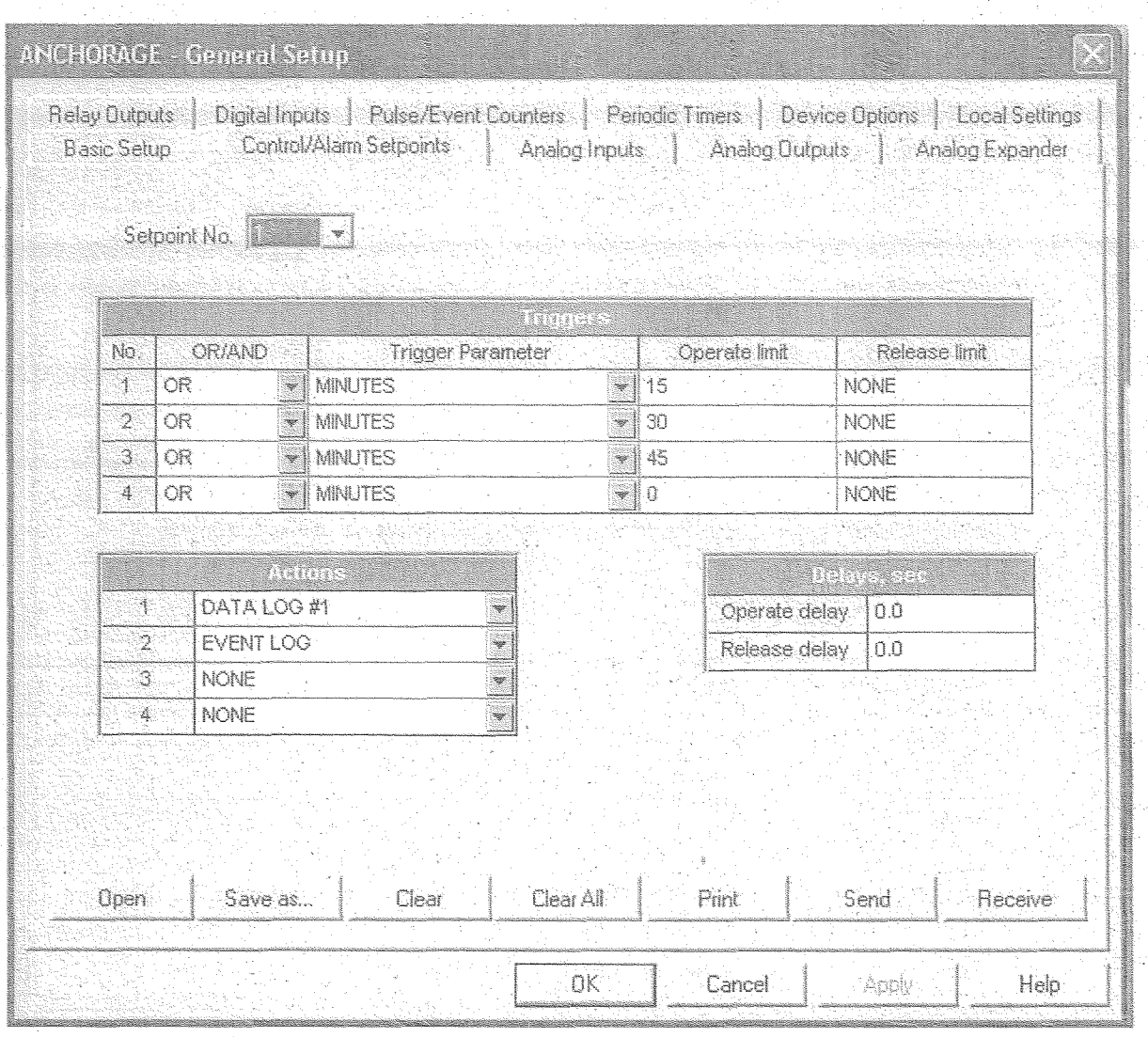


Click on the "Save As" button and save the file to the appropriate site.



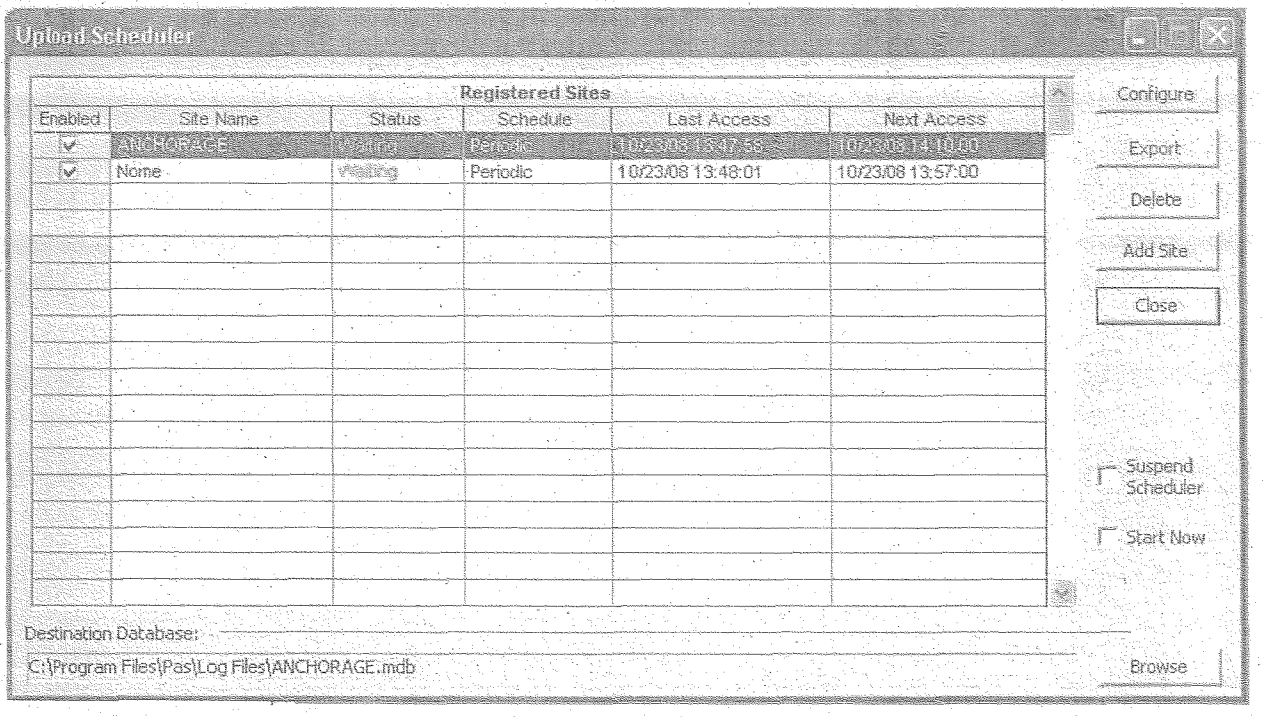
At this point, the database has been configured and is ready to send to the meter. On the Monitor Tab, select "OnLine". You should now be connected to the Meter in Real time. Back at the MeterSetup tab, choose "Download Setups". The configuration will now be sent to the meter.

After the site has been added, the meter configuration can be performed by clicking on the Meter setup tab. On the General setup screen, choose Control/Alarm Set points. The settings shown below will instruct the meter to record "Data Log #1" and the meters event log every quarter hour. Using a fifteen minute timer in this case will cause a time drift. Although the interval will be fifteen minutes, the records will not be on the quarter hour.

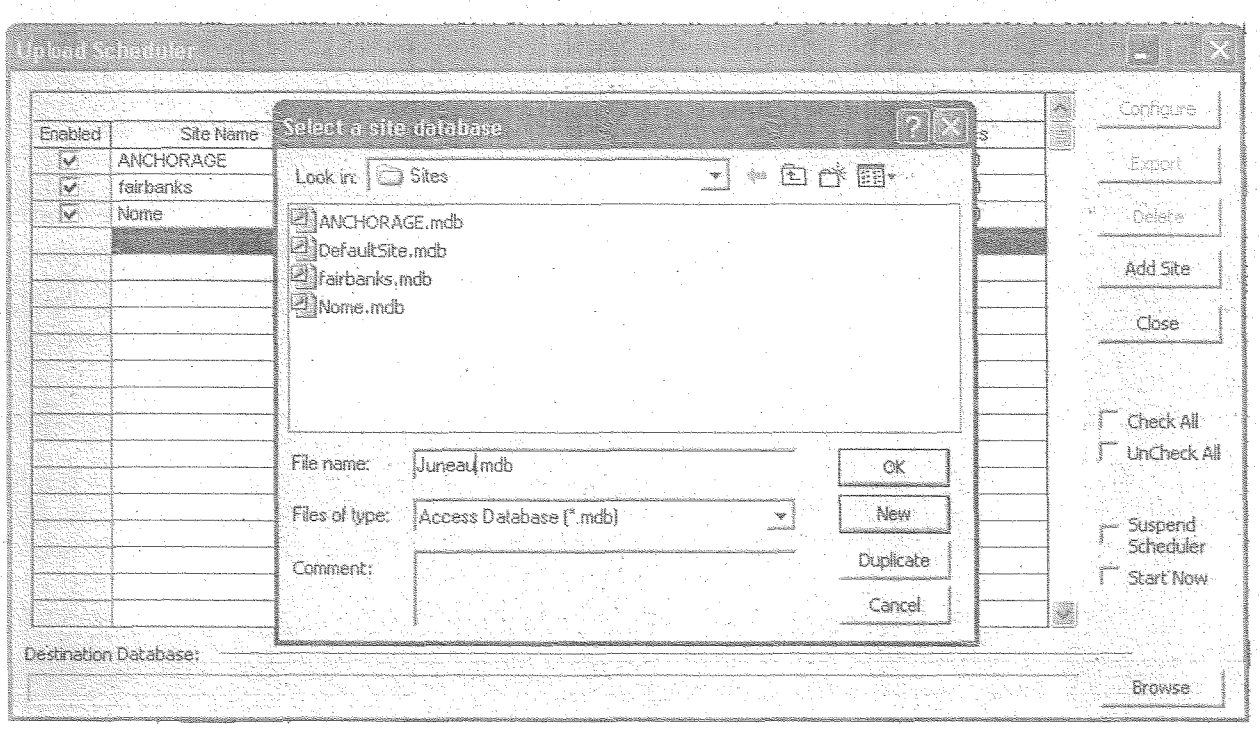


The PAS program utilizes a Microsoft Access Database to store the data retrieved from each of the meters. The information from each meter is stored in an individual file.

The configuration of the database is accomplished by the upload scheduler. The upload scheduler is found under the "Logs" tab.

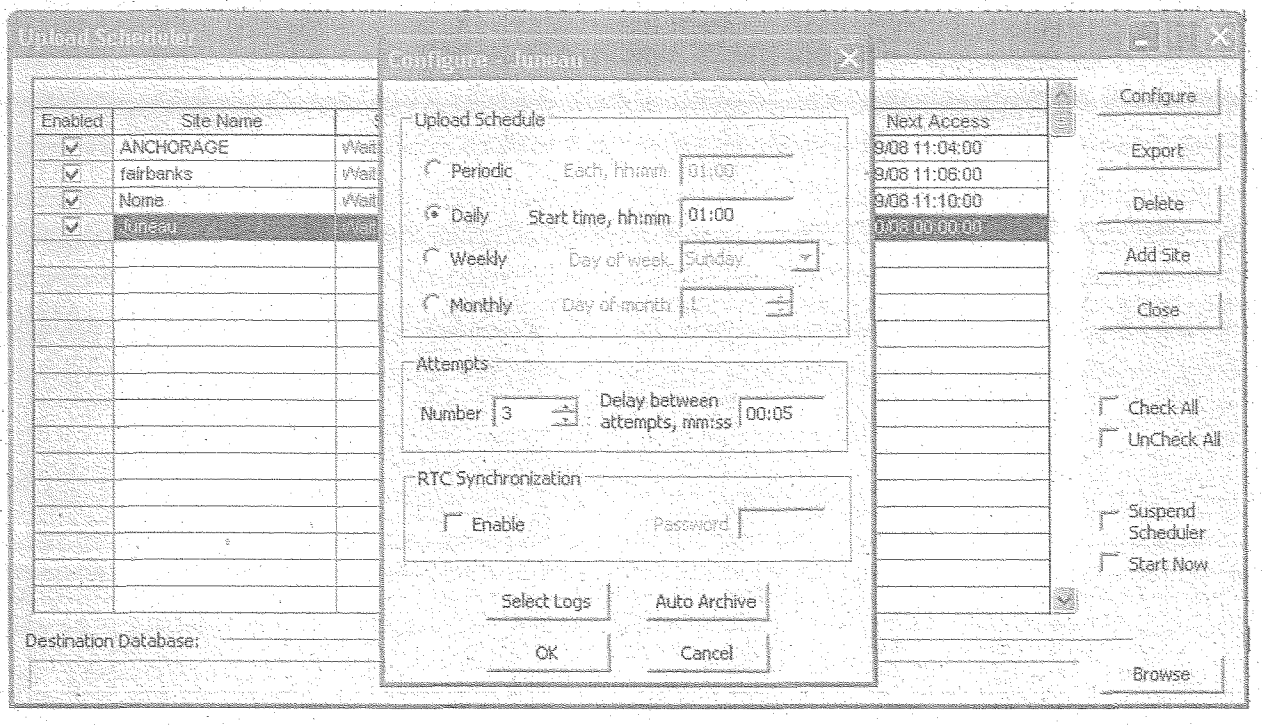


The file is location is entered at the bottom of this window. A file must be created for each location using the browse button (the files are not automatically created). Special consideration must be made when choosing the location for the files retrieved from the meters. A detailed discussion is at the end of this document.



Enter the file name and click on NEW to create a new location file.

Clicking the Configure button on the Upload Scheduler will open the following screen.

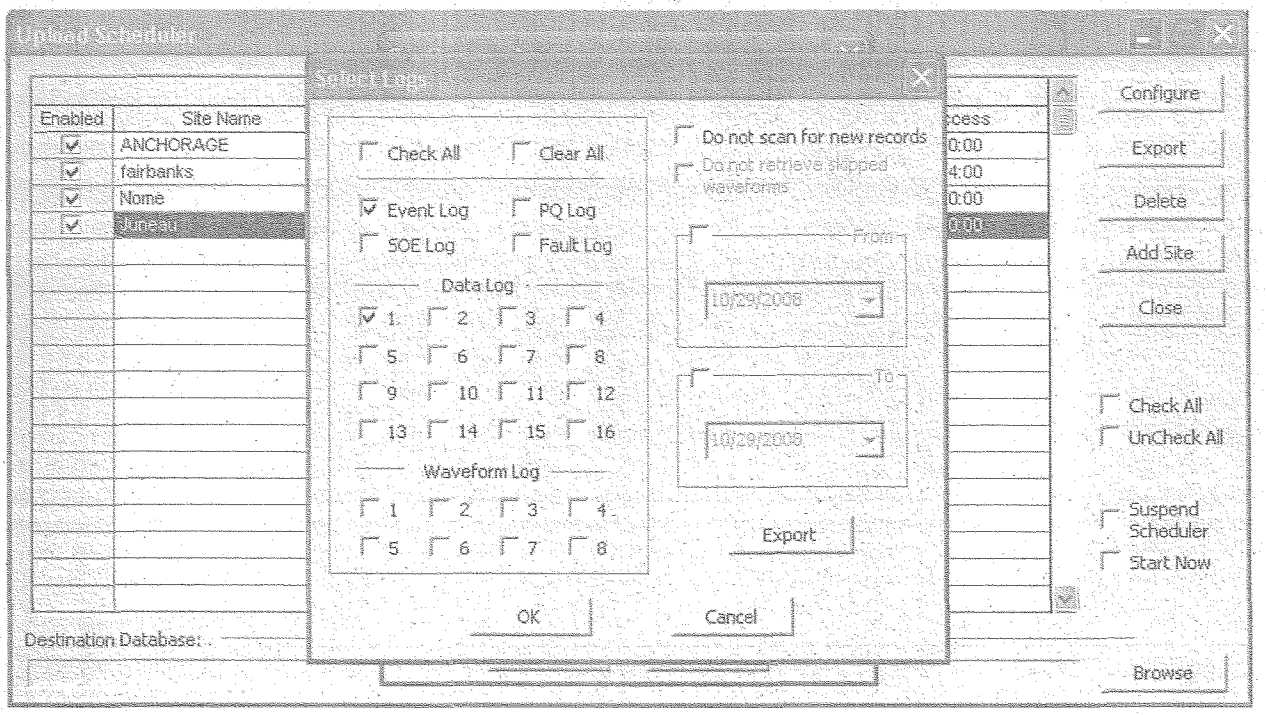


The suggested settings are shown here. This will upload daily at 1:00 a.m. Schedule the uploads for each meter at 5 minutes apart. This should allow for each meter to be read and the retries to time out before the next meter read starts. Then set the number of attempts to 3 and the Delay to 5 seconds. There is a wait for answer timer configured for 45 seconds on the connections tab. This timer sets the time delay for failed communications.

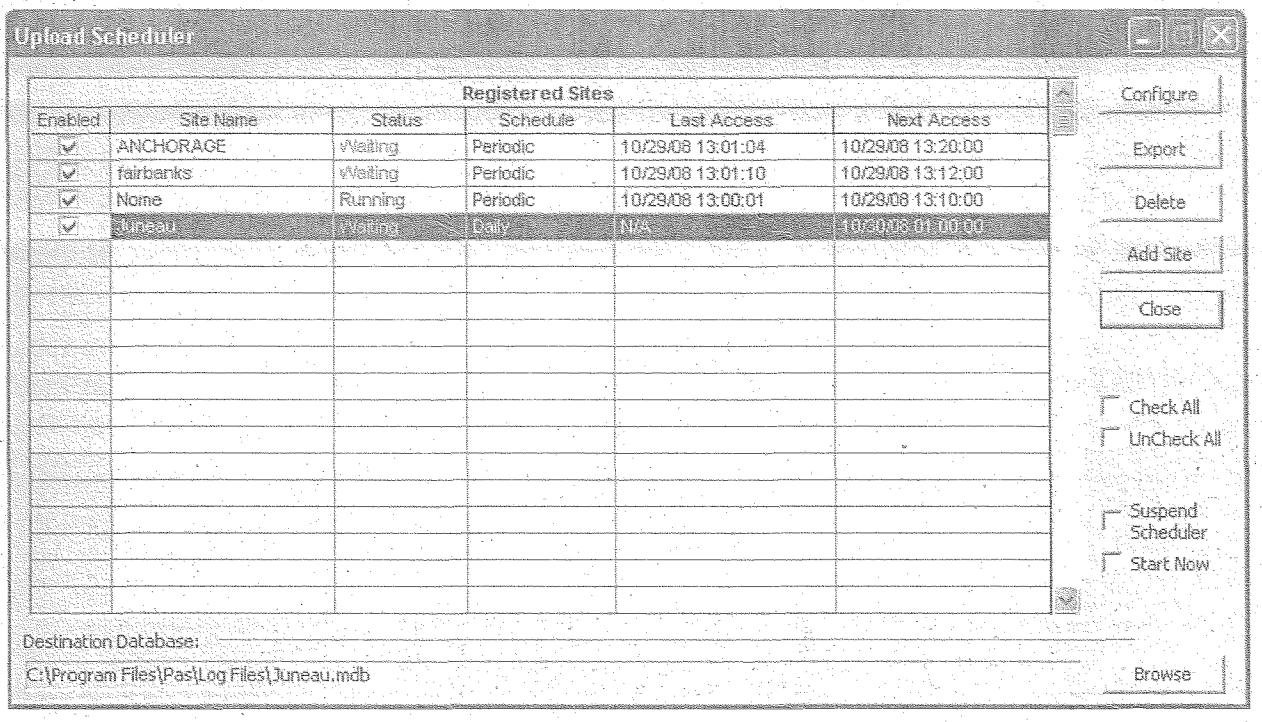
Do not enable RTC the real time clock Synchronization. A problem arose during testing with this feature. SATEC has been advised and are working to correct the issue.

Next, click on the select logs screen button at the bottom of the Configure screen.

Click on the Clear all check mark boxes and choose the Event Log and Data log #1 by clicking in the check mark boxes as shown below.

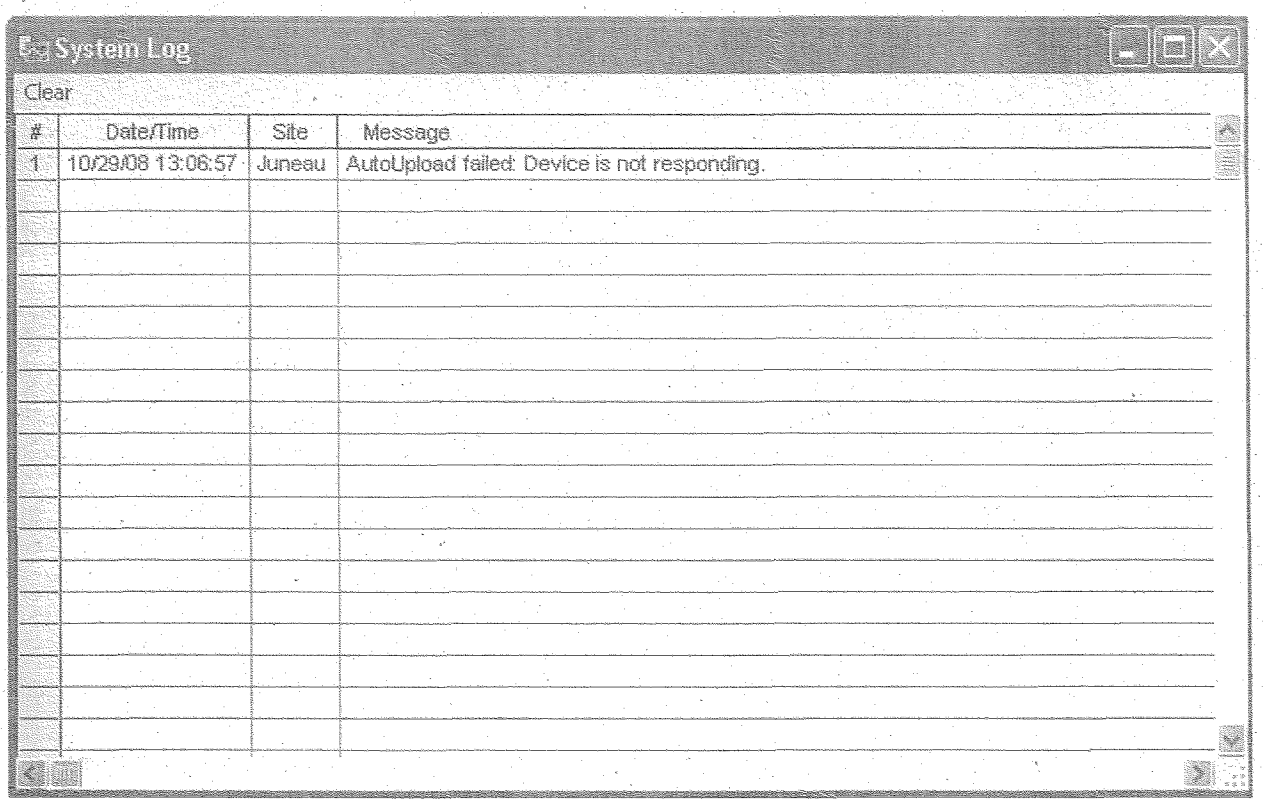


Click OK.



Note: To start the uploads, Click on Start now at the bottom right of the up load scheduler. This will force the upload of all Sites.

Verify proper operation by viewing the System Log under the view tab.



Alaska Energy Authority

A. Review of existing system

The system as designed is a fully custom design. The rights to the existing software are owned by AEA. AEA has a copy of all source code required to reproduce and modify all programs for the existing HMIs (Human Machine Interface).
The current charges for programming services by others are $4000.00 per site. This includes any particular modifications, maintenance and tech support for that site. The addition of a new rural community generating plant or modifications to an existing generating plant that require changes to the HMI must be done by someone familiar with AEA's software.

Enough training should be obtained by AEA to bring two AEA personnel up to a level of competence that will allow for the HMI software to be reconfigured and generating plants to be added to the system. Having internal personnel trained to configure the software will ensure that no loss of programming support will interrupt the installation of new systems nor will the maintenance of existing installations be affected.

There is no reason that AEA should not continue to use the presently configured custom software at this time. As the system increases in complexity and individual monitoring points increase a commercial available software may become more cost effective.

The existing system has limited security setup. There is not a username password challenge once the software has been installed. Each generation plant can be accessed without any limitations to individual personnel. Access to each site is not limited by a system firewall. The access to these systems should be secured. It is necessary to control access in order to ensure that the systems are not compromised by unauthorized persons. This includes existing and former employees.

A comparison with AEA's custom software and three versions of vendor software have been identified on the accompanying spreadsheet.

B. Vendor Software Packages

There are several manufacturers of Human Machine Interface (HMI) software. The comparison was made with these three vendor software packages:

1. Intouch part of Wonderware by Invensys Inc.
2. Citech HMI by Citech PTY. LTD.
3. Intellution IFIX by GE Fanuc International

There are a number of functions available in these software packages that have not been developed in AEA's custom software.
Some of the features included:

1. Analog data trending.
2. Alarm recording.
3. The ability to publish the HMI screens as a web page.
4. The ability to store data in a database. (i.e. SQL server)
5. The HMI screens are all active under one program package. This gives the user the ability to switch from one station to another without being required to start another executable file. All data from each station is stored under one executable program.

Each of the individual basic screens can be configured in approximately 8 hours. This is for a fully documented design with all tags configured and identified in a monitoring points list. Three to four screens for each generating plant.
For standardized generation plants the basic screens (after the initial development) can be copied to save time and the tags created for a new generating plant.

The creation of new screens and modification of existing screens is accomplished with a drag and drop interface. Development of new screens and modification of existing screens could be performed in-house by trained AEA staff. An understanding of the underlying programming is not necessary.

Each of the commercial software suppliers offer training packages. In general the basic training courses are 4 days long and give the student enough understanding of the software to configure the software for data retrieval and setup screens similar to what is now displayed on AEA's custom software. Formal training is available from Invensys for any number of employees. A 5 day training course in Lake Forest, Calif. is $2785 per person this does not include airfare, lodging or meals.

C. Microsoft Operating Systems

1. The next major change in windows operating systems will take place on January 31, 2009 when Microsoft has a planned end date for the supply of Windows XP to system builders. The following table is a history of the availability of various Microsoft operating systems. AEA should verify that the existing HMI screens and any future screens will be compatible with the operating system that will replace Windows XP.
2. With standard annual support packages available from each software manufacturer compatibility with new versions of the computer operating systems is insured.

ATTACHMENT A

Microsoft Windows Life-Cycle Policy

Published: October 15, 2002 | Updated: April 3, 2008

License Availability Roadmap

Desktop Operating Systems	Date of General Availability	Direct OEM and Retail License Availability (end date)	System Builder License Availability (end date)
MS DOS 6.xx	June 1, 1994	November 30, 2001	November 30, 2001
Windows 95	August 15, 1995	December 31, 2000	December 31, 2001
Windows NT Workstation 4.xx	July 29, 1996	June 30, 2002	June 30, 2003
Windows 98	June 30, 1998	June 30, 2002	November 30, 2003[1]
Windows 98 SE	June 30, 1999	June 30, 2002	March 31, 2004[1]
Windows Millennium Edition (Windows Me)	December 31, 2000	December 31, 2003	June 30, 2004
Windows 2000 Professional	March 31, 2000	March 31, 2004	March 31, 2005
Windows XP Professional	December 31, 2001	June 30, 2008	January 31, 2009
Windows XP Tablet PC Edition	February 11, 2003	June 30, 2008	January 31, 2009
Windows XP Professional x64 Edition	April 25, 2005	June 30, 2008	January 31, 2009
Windows XP Home Edition	December 31, 2001	June 30, 2008[3]	January 31, 2009
Windows XP Media Center Edition[2]	October 28, 2002	June 30, 2008	January 31, 2009

D. Conclusions:

With the possibility of changes in the availability of software and services an alternative solution is suggested. A couple of possibilities are suggested by this study.

1. Continue to use the custom software for the HMI in each generation plant. The software owned by AEA can be modified for use in the generation plants that will require retrofitting. These generating plants will be brought up to AEA's standard for remote monitoring and automation. The custom software is used to create additional HMI's for new generating plants. This software is used for trouble shooting when AEA is called upon for technical assistance. A number of AEA personnel should be trained to use and configure the existing software.

2. Continue to use the custom software as the HMI for new and retrofitted power plants. The Master station to be located in Anchorage could be migrated to one of the software packages. An off the shelf software could be used to perform the Master station function at the Anchorage location. This hybrid solution adds functionality to the master station at a minimal cost in additional software. A development version and a runtime version can be used. AEA personnel would require training for master station configuration and maintenance.

3. Replace the custom software completely. Use the off the shelf software for the master station and HMI at all power plants including the new and retrofitted power plants. This solution is the most expensive (a new runtime license is required at each power plant). However AEA personnel would be required to maintain only one version of software.

This study suggests the implementation of the 2nd solution. The existing software is limited in functionality. The trending and event recording capabilities of the vendor supplied software would satisfy a number of data requirements that AEA has for the power plant monitoring and control. The vendor software allows for the addition of Master station screens via a graphical interface simplifying the configuration of the software.

Three versions of vendor software have been identified on the accompanying spreadsheet. The suggested software for the Master Station is Intouch by Wonderware. Intouch has a slight cost advantage over the other software offered by other vendors. The training required to configure Intouch is minimal.

ATTACHMENT A

Criteria	Wonderware	Citech	Intellution	Existing SCADA Software
	1500 TAGS	1500 TAGS	unlimited	
Initial Cost software	5980	6705	8715	4000
Installation Cost				
Labor per hour	100	100	100	0
Additional Sites	800	800	800	0
Development Cost				
Labor Per Hour	100	100	100	0
Additional Features	per hour	per hour	per hour	0
Additional Sites	3500	3500	3500	0
Software Upgrade Cost				
Labor Per Hour	100	100	100	0
Additional Sites	3015	6705	3244	0
Warranty				
Included			1year	NA
Licensing Fee				
Recurring	None	None	None	NA
Tech Support				
Included			1 year	
24Hrs	1799 per Annum	1005 per Annum	1104 per Annum	0
Per Incident				
After Hours				
Geo. Location	Irvine Ca.	San Fancisco Ca.	Charlottesville Va.	
Training				
Included				
On Site				
At Mfg.	2225 BASIC COURSE	1650 BASIC COURSE	2495 BASIC COURSE	
Labor Per Hour not previously specified				